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## A SIMPLE BUTTER COLOR STANDARD.

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The object of the butter standard is to compare the color of butter fat in a melted condition with liquid colors of definite chemical composition.

### THE APPARATUS.

The apparatus consists of a specially constructed rack, a small glass funnel with filter papers to fit, and a small porcelain dish. The rack as shown in the illustration is constructed of wood and arranged to hold 22 test tubes. The strip of wood along the front is placed so that only  $1\frac{3}{4}$  inches of the lower part of the test tubes may be seen. At the back a strip of ground glass extends from the bottom to the top. The test tubes used in the rack are approximately 12 by 100 millimeters ( $\frac{1}{2}$  by 4 inches).

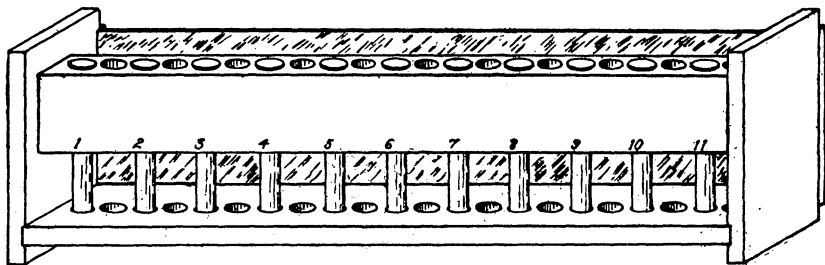


FIG. 1.—The butter color standard, with color tubes in place.

Eleven test tubes filled with standard color solutions corresponding to the numbers 1 to 11 and ranging from light to dark are placed in the rack as indicated in the illustration. Each test tube contains approximately 9 cubic centimeters of color solution. After the solution is put in the tube the open end should preferably be drawn out with heat and closed, so as to seal it hermetically. If this can not be done the tube may be corked with a cork stopper which has been

soaked in hot paraffin and then sealed with sealing wax. When making an apparatus of this type, test tubes of the size mentioned must be used, as larger or smaller tubes would not show the true shades and so would change the standard.

#### COMPOSITION OF THE COLORS.

The tubes in the rack are filled with a solution of chemically pure potassium bichromate ( $K_2Cr_2O_7$ ) of varying strengths so arranged as to give a range of color from a light to a dark yellow. Each shade is given a numerical value and is made as shown below:

*Composition of colors in the butter color standard.*

Color No.	Two per cent solution of potassium bichromate ( $K_2Cr_2O_7$ ).	Distilled water added.
	c. c.	c. c.
1	1	100
2	1	75
3	1	50
4	2	50
5	3	51
6	5	60
7	7	63
8	9	48
9	12	48
10	21	49
11	32	48

No. 1 of the colors is the lightest shade, No. 11 the darkest. No. 7 corresponds to the color of normal June butter.

Only chemically pure potassium bichromate should be used, and the solutions must be measured accurately. The test tubes and stoppers must be thoroughly clean, and distilled water must be used, otherwise organic matter may be present and cause a change in the color of the potassium bichromate solution.

#### THE OPERATION OF THE STANDARD.

To determine the color of butter by this standard, melt a small amount and when hot filter through the filter paper directly into an empty test tube of the same size as those in the standard. The fat should be filtered until perfectly clear, and care should be taken to have no water mixed with it. The tube of butterfat should then be heated until hot, as when cooled it is not perfectly clear and will not match the chemical standards. To determine the color of the sample the tube of hot butterfat is inserted between the tubes of the standard and moved along the scale until the color of the fat matches one of the chemical tubes. It is then designated with the number of the tube to which it corresponds the nearest in color.

To compare the color the rack should be held before a strong light (daylight and not artificial light), the lower front edge being held on a level with the eye and slightly higher than the back edge of the rack.

### CONCLUSIONS.

This color standard has been used successfully by one of the large butter companies. They have standards in use in 15 of their largest creameries, and as the lots of butter come in color tests are made and reported according to the numbers on the standard. The butter maker upon receiving the report knows how the color of his butter compares with the agreement made between the buyer and the creamery.

It is believed that this standard offers a simple and accurate method of measuring the color of butter.

The standard should be of greatest value in the spring and fall, when the feed of the cows is changed from dry to green or from green to dry, as the case may be, since at these periods the color of butter varies the most. Slight changes in the color of butter may not be noticed by the butter maker in his daily churnings, but will be shown by daily tests with the color standard. By thus determining the color any change from the uniform shade desired will be seen, and the color may be kept up to normal by varying the quantity of coloring matter.

If a market demands a certain colored butter the buyer may specify a butter of the desired color by using a number from this color standard. The butter maker may then test his butter with the standard and color it to the desired extent. For example, if the color of butter is 5 on the standard and 7 is demanded by the buyer, then butter color may be increased until the butter tests 7 on the standard.

One of the greatest advantages of this standard is that the color is permanent, provided chemically pure potassium bichromate is used, together with distilled water, and clean test tubes hermetically sealed or closed with paraffin-coated cork stoppers and sealing wax.

It is advisable when not using the standard to keep it in a dark closet, since the presence of a slight amount of organic matter introduced through imperfectly distilled water or unclean tubes might slowly cause a slight change of color if the standard was constantly exposed to a strong light.

Approved:

JAMES WILSON,

*Secretary of Agriculture.*

WASHINGTON, D. C., April 26, 1912.

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